


114. (Amended) A system for replicating data at multiple devices, comprising:  
A<sub>15</sub> a store at each of said devices, each of said stores containing replicas of a data  
object; and  
a manager associated with each store that detects and records operations performed  
on the data object in the form of a graph of atoms containing at least one parent atom  
having at least two descendant atoms, and that updates the history of the data object by  
receiving atoms that are contained in a graph at one store and adding said atoms to the  
graph in another store.

**REMARKS**

The independent claims have been amended to further clarify the distinctions  
between the present invention and the known prior art.

Respectfully submitted,

BURNS, DOANE, SWECKER & MATHIS, L.L.P.

By:   
James A. LaBarre  
Registration No. 28,632

P.O. Box 1404  
Alexandria, Virginia 22313-1404  
(703) 836-6620

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**Attachment to Preliminary Amendment dated February 20, 2003**

**Marked-up Claims 1, 5, 6, 10, 13, 24, 31, 67, 77, 84, 87, 94, 97, 109, 113 and 114**

1. (Amended) A method for replicating data at multiple devices, comprising the steps of:

representing the history of a data object at each of said devices by means of a graph of atoms in a store, where said graph includes at least one parent atom of a first type of atom that contains information pertaining to an operation performed on the data object and at least two descendant atoms of said first type;

adding an atom of said first type to the atom graph in the store at a given device when an operation is performed on the data object at said given device; and

updating the history of the data object at another device by transmitting to said other device at least one atom that is present in the store at said given device and absent from the store at said other device.

5. (Amended) The method of claim [4] 1 wherein said two descendant atoms contain information that pertains to different respective versions of said data object.

6. (Amended) The method of claim [4] 1 wherein said atom graphs further include a second type of atom that contains information pertaining to an attribute of the data object.

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**Marked-up Claims 1, 5, 6, 10, 13, 24, 31, 67, 77, 84, 87, 94, 97, 109, 113 and 114**

10. (Amended) The method of claim [4] 1 wherein the operation on the data object comprises a change in the contents of the data object.
13. (Amended) The method of claim [4] 1 wherein the atom graph in the store at a given device has a cursor that identifies one atom in the graph that is associated with a current version of the data object at that device.
24. (Amended) The method of claim [4] 1 further including the steps of generating metadata pertaining to a data object, and applying business rules to said metadata at a store to determine a current view of the object that is presented by an application.
31. (Amended) The method of claim [4] 1 further including the step of assigning an atom in a store to a bundle for transmission to another device during an update step.
67. (Amended) The method of claim [4] 1 wherein said updating step comprises the transmission of information pertaining to atoms from a sender store to a receiver store.
77. (Amended) The method of claim [4] 1 further including the step of encrypting information pertaining to an atom using a public-private key pair.

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**Marked-up Claims 1, 5, 6, 10, 13, 24, 31, 67, 77, 84, 87, 94, 97, 109, 113 and 114**

84. (Amended) The method of claim [4] 1 wherein each of said stores is associated with a space that pertains to a set of information, and different ones of said stores are respectively associated with different spaces.

87. (Amended) The method of claim [4] 1 wherein one store is associated with a hub device, and said updating step is carried out unidirectionally from the store at said hub device to all of the other stores.

94. (Amended) The method of claim [4] 1 wherein one store is associated with a hub device, and said updating step is carried out bidirectionally between the store at said hub device and all of the other stores.

97. (Amended) The method of claim [4] 1 wherein stores are present at a multiplicity of devices, and a store at any device is capable of performing said updating step with a store at any other device.

109. (Amended) A method for replicating data at multiple devices, comprising the steps of:

representing the history of a data object at each of first and second devices by means of a graph of atoms, where said atoms contain information pertaining to changes in the

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**Marked-up Claims 1, 5, 6, 10, 13, 24, 31, 67, 77, 84, 87, 94, 97, 109, 113 and 114**  
content of the data object, and said graph contains at least one parent atom having at least two descendant atoms;

adding an atom to the atom graph at said first device when a change is made to the data object at said first device; and

updating the history of the data object at a second device by forming a new graph at said second device that is a strict superset of the of the atom graph that existed at said second device prior to said updating step, and a non-strict subset of the union of the atom graphs that existed at said first and second devices prior to said updating step.

113. (Amended) The method of claim [112] 109 wherein said two descendant atoms contain information that pertains to different respective versions of said data object.

114. (Amended) A system for replicating data at multiple devices, comprising:  
a store at each of said devices, each of said stores containing replicas of a data object; and

a manager associated with each store that detects and records operations performed on the data object in the form of a graph of atoms containing at least one parent atom having at least two descendant atoms, and that updates the history of the data object by receiving atoms that are contained in a graph at one store and adding said atoms to the graph in another store.